

CLAIMS:

1. A laser modulating and driving device comprising:
 - 5 a modulation signal generating unit configured to generate a laser modulation signal consisting of a pair of small swing differential signals based on pixel data; and
 - a driving unit configured to drive a laser
 - 10 according to the laser modulation signal supplied from the modulation signal generating unit.
- 15 2. The laser modulating and driving device of claim 1,
 - wherein the modulation signal generating unit has a modulation circuit configured to produce a modulation signal, and a small swing differential
 - 20 signal output circuit configured to convert the modulation signal to said pair of small swing differential signals, and
 - the driving unit has a small swing differential signal input circuit for receiving said pair of small
 - 25 swing differential signals.

5 3. The laser modulating and driving device of claim 2,
 wherein the small swing differential signal output
 circuit includes:

 a non-inverted and inverted signal generating
 circuit configured to produce a non-inverted signal
10 having the same phase as the modulation signal and an
 inverted signal with the phase shifted by 180 degrees
 from the modulation signal; and

 a small swing output circuit configured to reduce
 swings of the non-inverted signal and the inverted
15 signal to output said pair of small swing
 differential signals as the laser modulation signal.

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 4. The laser modulating and driving device of claim 3,
 wherein the small swing output circuit is formed as
 current mode logic (CML) or emitter coupled logic
 (ECL) .

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5. The laser modulating and driving device of claim 4,
5 wherein a reference potential of the CML or ECL is a
supply voltage VCC of the modulation signal
generating unit.

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6. The laser modulating and driving device of claim 4,
wherein a reference potential of the CML or ECL is an
intermediate potential lower than a supply voltage
15 VCC of the modulation signal generating unit.

20 7. The laser modulating and driving device of claim 4,
wherein the small swing differential signal output
circuit further includes swing reducing means
arranged before the CML or ECL to decrease the swing
of the non-inverted and inverted signals input to the
25 CML or ECL.

5 8. The laser modulating and driving device of claim 2,
 wherein the small swing differential signal output
 circuit has a first supply voltage, and the small
 swing differential signal input circuit has a second
10 supply voltage different from the first supply
 voltage.

15 9. The laser modulating and driving device of claim 2,
 wherein the small swing differential signal input
 circuit has a differential signaling circuit using
 transistors.

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 10. The laser modulating and driving device of claim
 1, further comprising:
25 a signal transmission line configured to connect

the modulation signal generating unit and the driving unit, through which said pair of small swing differential signals propagate; and

5 a first resistor that terminates said pair of small swing differential signals at an output end of the signal transmission line.

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11. The laser modulating and driving device of claim 10, further comprising:

15 a second resistor connected parallel to the first resistor and arranged at an input end of the signal transmission line to couple said pair of small swing differential signals.

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12. The laser modulating and driving device of claim 1, wherein the modulation signal generating unit and the driving unit are formed as spatially separated blocks, the laser modulating and driving device
25 further comprising:

a signal transmission line for connecting the blocks to transmit the laser modulation signal from the modulation signal generating unit to the driving unit.

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13. The laser modulating and driving device of claim 10 12, further comprising:

a pixel data generating unit configured to supply the pixel data to the modulation signal generating unit, wherein the pixel data generating unit and the modulation signal generating unit are formed on the 15 same board.

20 14. The laser modulating and driving device of claim 12, further comprising:

a pixel data generating unit configured to supply the pixel data to the modulation signal generating unit, wherein the pixel data generating unit and the 25 modulation signal generating unit are formed as a

single integrated circuit.

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15. The laser modulating and driving device of claim
1, wherein the modulation signal generating unit has
an output-stage inverter or buffer having a supply
terminal, to which a first voltage lower than a
10 supply voltage of the modulation signal generating
unit is applied.

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16. The laser modulating and driving device of claim
1, wherein the modulation signal generating unit has
an output-stage inverter or buffer having a ground
terminal, to which a second voltage higher than a
20 ground voltage is applied.

25 17. The laser modulating and driving device of claim

1, wherein the modulation signal generating unit has
an output-stage inverter or buffer having a supply
terminal, to which a first voltage lower than a
supply voltage of the modulation signal generating
5 unit is applied, and a ground terminal, to which a
second voltage higher than a ground voltage is
applied.

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18. The laser modulating and driving device of claim
1, wherein the modulation signal generating unit has
an output-stage inverter or buffer using a transistor,
15 and wherein at least one of a high potential and a
low potential that defines the a swing of said pair
of small swing differential signals is generated by
an ON resistance of the transistor.

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19. The laser modulating and driving device of claim
1, wherein the modulation signal generating unit has
25 an output-stage inverter or buffer and a resistor

connected in series with the output-stage inverter or buffer to reduce a swing of an output of the output-stage inverter or buffer.

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20. The laser modulating and driving device of claim 1, wherein the modulation signal generating unit is
10 formed in a block spatially separated from the driving unit, and has an output-stage inverter or buffer and a resistor arranged outside the block to reduce a swing of an output of the output-stage inverter or buffer.

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21. The laser modulating and driving device of claim 20
20 1, wherein the modulation signal generating unit has an output-stage inverter or buffer and a resistor connected to an output from the output-stage inverter of buffer to reduce a swing of the output from the output-stage inverter or buffer, and the driving unit
25 has an input-stage differential signaling circuit

using a transistor.

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22. The laser modulating and driving device of claim
1, wherein the modulation signal generating unit has
a first supply voltage, and the driving unit has a
second supply voltage higher than the first supply
10 voltage.

15 23. A laser modulating and driving device comprising:
a pixel data generating unit configured to
produce pixel data and formed in a first block;
a modulation signal generating unit configured to
generate a laser modulation signal from the pixel
20 data and formed in the first block together with the
pixel data generating unit;
a driving unit configured to drive a laser
according to the laser modulation signal supplied
from the modulation signal generating unit and formed
25 in a second block spatially separate from the first

block; and

a signal transmission line connecting between the first block and the second block and transmitting the laser modulation signal.

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24. The laser modulating and driving device of claim
10 23, wherein the first block and the second block are independent printed circuit boards (PCB) or application specific integrated circuits (ASIC).

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25. The laser modulating and driving device of claim
23, wherein the modulation signal generating unit has a small swing differential signal output circuit
20 configured to output a pair of small swing differential signals as the laser modulation signal, the driving unit has a small swing differential signal input circuit configured to receive said pair of small swing differential signals, and the signal
25 transmission line is configured to transmit said pair

of small swing differential signals.

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26. The laser modulating and driving device of claim
25, wherein the small swing differential signal
output circuit has an output-stage circuit configured
by a first logic, and the small swing differential
10 signal input circuit is configured by a second logic
different from the first logic.

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27. The laser modulating and driving device of claim
26, wherein the first logic is current mode logic or
emitter coupled logic.

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28. The laser modulating and driving device of claim
26, wherein the second logic is differential
25 signaling using a pair of transistors.

5 29. The laser modulating and driving device of claim
25, wherein the small swing differential signal
output circuit has a first supply voltage, and the
small swing differential signal input circuit has a
second supply voltage different from the first supply
10 voltage.

15 30. An image reproducing apparatus comprising:
a photosensitive unit;
a light source using a laser;
a laser modulation signal generating unit formed
in a first block and configured to produce a laser
20 modulation signal consisting of a pair of small swing
differential signals based on pixel data;
a driving unit formed in a second block spatially
separated from the first block and configured to
drive the laser according to the laser modulation
25 signal;

a signal transmission line connecting between the first block and the second block for transmitting the laser modulation signal to the driving unit; and

5 a deflecting optical system for guiding and deflecting a laser beam emitted from the light source onto the photosensitive unit to form a latent image thereon.

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31. The image reproducing apparatus of claim 30, wherein the first block and the second block are formed as independent printed circuit boards (PCB) or
15 application specific integrated circuits (ASIC).